COLLECTIONS OF LARVAL GULF MENHADEN, BREVOORTIA PATRONUS, FROM GALVESTON ENTRANCE (1959-1969) AND SABINE PASS (1963-1967), TEXAS[1/]

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ABSTRACT

The number of larvae, that were taken per tow with a Renfro beam trawl, and the dates of collection are given for two Texas inlets.

INTRODUCTION

The Gulf menhaden, Brevoortia patronus, is one of the most important clupeid fishes in the Gulf of Mexico. In 1970, 558.5 thousand metric tons with an estimated value of $23.2 million were landed in the northern Gulf (National Marine Fisheries Service, 1971). In addition, young menhaden play an important role in the ecology of estuarine waters. Gulf menhaden spawn offshore over the continental shelf from October through March, and soon after, the larvae enter estuaries in the northern Gulf. Information on the relative numbers of menhaden entering the estuaries is useful in studying the dynamics of the population and the status of the stocks.

Plankton collections were taken semiweekly at Galveston Entrance, Texas, from 1959 to 1969 and weekly at Sabine Pass, Texas, from 1963 to 1967 by personnel of National Marine Fisheries Service, Galveston, Texas, during their shrimp investigations.

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Gulf menhaden larvae were subsequently sorted and identified from these collections by Fore and Baxter.[3/]

The purpose of this report is to record the dates of collection and the actual number of Gulf menhaden larvae obtained in each tow (Tables 1 and 2). The monthly size distribution of the larvae from Galveston Entrance, Texas, for five biological years are listed in Table 3. The above data represented without interpretation of their significance.

Associated hydrographic data at Galveston Entrance from 1959 to 1963 were previously reported by Baxter and Renfro (1967). Environmental data relative to the other collections in this report are on file at the National Marine Fisheries Service, Galveston, Texas.

MATERIALS AND METHODS

All collections were made with a hand-drawn beam trawl (Renfro, 1963) during daylight hours. Usually, pelagic larvae are undersampled during the day because of net avoidance. Diel fluctuations in the catch of menhaden larvae were reported by Fore and Baxter (In press) who collected three times more larvae at night than during the day in a 96-hr study at Galveston Entrance.

A similar sampling procedure was used during each collection. A 46-m line was tied to a post that was driven into the sand at the shoreline. The operator held the outermost end of line in one hand and the bridle of the trawl in the other. Then, the sampling gear was pulled along the bottom in a continuous semicircular arc from one shoreline to the other. The depth of the water column that was sampled varied from 0 to 1.3 m. The average volume of water strained during a given tow was 70 m^3. The sampling procedure was described in greater detail by Baxter (1963) and Baxter and Renfro (1967).

Routine collections were made throughout the year on approximately the same semiweekly or weekly schedule. Tables 1 and 2 show only the sampling periods from October through May, since no Gulf menhaden larvae were collected in June, July, August, or September of any year at either pass. One tow was made on each sampling date. The dash (-) in Tables 1 and 2 designates those samples that were not available for examination.

Three consecutive sampling sites were employed during this investigation at Galveston Entrance, Texas. The first site was established on the sand flats near the south jetty of Galveston Island from 9 November 1959 to 8 September 1961. Following the destruction of this site by Hurricane Carla, a new station was selected on the west side of Fort Travis ruins on Bolivar Peninsula from 25 September to 21 November 1961. When this section of beach was fenced off, a third sampling site was established between the north jetty and Fort Travis ruins on Bolivar Peninsula for the remainder of the study. The sampling sites at Galveston Entrance were illustrated by Baxter (1963).

The study site at Sabine Pass, Texas, was approximately 180 m south of the old U.S. Coast Guard Station on the west side of Sabine Pass channel.

[3/] Fore, P. L., and K. N. Baxter. Occurrence and relative abundance of larval Gulf menhaden, Brevoortia patronus, at two Texas inlets. Unpublished manuscript. National Marine Fisheries Service, Gulf Breeze Field Station, Gulf Breeze, FL 32561.

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Table 1.--Number of larval Gulf menhaden per tow collected with a Renfro beam trawl at Galveston Entrance, Texas, 1959 to 1969.

Date			Number of larvae
1959	Nov.	9	0
		16	0
	Dec.	11	32
		18	14
		21	17
		31	3
1960	Jan.	8	0
		13	0
		15	299
		19	113
		22	94
		25	54
		28	69
	Feb.	1	1
		5	33
		9	0
		11	--
		16	1
		18	116
		24	--
		25	9
	Mar.	1	15
		3	533
		7	6
		11	469
		15	--
		18	75
		22	15
		28	--
	Apr.	1	--
		5	13
		8	29
		12	7
		15	50
		19	0
		21	0
		26	0
		29	0
	May	3	0
		6	--
		10	0
		13	0
		17	--
		20	--
		23	0
		26	--
		31	0
	Oct.	3	0
		7	0
		11	0
		14	0
		17	0
		20	0
		25	0
		28	0
		31	0
	Nov.	3	0
		7	21
		10	3
		15	2
		18	3
		21	41
		25	91
		28	1

Table 1.—Continued.

Date			Number of larvae
1960	Dec.	2	0
		6	13
		9	19
		13	11
		16	67
		19	83
		22	272
		27	408
		29	217
1961	Jan.	3	6
		6	752
		10	281
		13	212
		16	226
		20	83
		25	3
		27	9
		30	50
	Feb.	3	8
		7	279
		10	7
		17	5
		21	1,359
		24	20
		27	86
	Mar.	3	3
		6	111
		10	5
		14	0
		17	202
		21	10
		27	3
		31	74
	Apr.	5	2
		7	0
		11	71
		17	10
		21	2
		25	0
		28	0
	May	2	--
		8	--
	Oct.	2	0
		5	0
		10	0
		12	0
		16	3
		19	7
		23	0
		25	0
		27	14
		30	2
	Nov.	3	2
		6	0
		9	2
		14	4
		16	10
		21	0
		24	4
		27	1
		30	1
	Dec.	5	4
		8	6
		11	0
		14	181
		19	0
		22	3
		26	0
		29	9

Table 1.--Continued.

Date			Number of larvae	Date			Number of larvae
1962	Jan.	2	0	1962	May	7	0
		4	2			10	0
		9	125			15	0
		12	0			18	0
		15	74			21	0
		17	94			24	0
		23	8			29	0
		26	20				
		29	0		Oct.	2	0
						5	0
	Feb.	1	0			8	0
		6	51			11	0
		9	28			16	0
		12	0			19	0
		15	20			22	0
		19	27			25	0
		23	9			30	0
		26	20				
					Nov.	2	0
	Mar.	1	32			5	0
		6	24			8	0
		9	35			13	2
		12	4			16	0
		16	13			19	0
		20	403			23	0
		23	5			26	1
		26	0			29	0
		29	2				
					Dec.	3	1
	Apr.	4	554			6	31
		6	8			11	0
		9	2			14	21
		12	26			17	0
		17	42			20	0
		20	1			26	36
		23	3			28	67
		26	0			31	33
	May	1	0				
		3	0				

Table 1.--Continued.

Date			Number of larvae	Date			Number of larvae
1963	Jan.	4	12	1963	May	3	0
		8	28			6	0
		11	0			9	0
		14	1			14	0
		17	9			17	0
		22	3			20	0
		25	0			23	0
		28	48			28	0
		31	0			31	0
	Feb.	5	12		Oct.	1	0
		7	0			4	0
		11	21			7	0
		14	10			10	0
		19	7			15	1
		21	0			18	0
		25	2			21	2
		28	28			24	0
						29	0
	Mar.	5	56				
		8	18		Nov.	1	0
		11	70			4	0
		14	87			7	16
		19	0			12	41
		22	32			15	1
		25	273			18	9
		28	48			26	6
	Apr.	2	86		Dec.	2	2
		5	4			5	0
		8	0			10	0
		11	0			13	0
		16	0			16	14
		19	—			19	67
		22	0			24	0
		25	0			27	--
		30	0			30	56

Table 1.--Continued.

Date			Number of larvae
1964	Jan.	2	30
		7	2
		10	14
		13	19
		16	3
		21	1
		24	36
		27	0
		30	159
	Feb.	4	2,741
		7	801
		10	22
		13	61
		18	72
		20	95
		24	10
		27	15
	Mar.	3	34
		6	18
		9	40
		12	100
		17	118
		20	81
		23	16
		26	103
		31	63
	Apr.	3	27
		6	2
		9	1,097
		14	551
		17	--
		20	9
		23	--
		28	0
1964	May	1	14
		4	0
		7	1
		12	0
		15	0
		18	0
		21	0
		26	0
		29	0
	Oct.	2	0
		5	0
		9	0
		13	0
		16	0
		19	0
		22	0
		27	0
		30	3
	Nov.	2	1
		5	0
		10	0
		13	1
		16	4
		19	1
		24	2
		30	7
	Dec.	3	22
		8	1
		11	1
		14	2
		17	3
		22	4
		24	3
		28	2
		31	3

Table 1.--Continued.

Date			Number of larvae
1965	Jan.	5	14
		8	3
		11	1
		15	3
		19	3
		22	6
		25	15
		28	20
	Feb.	2	41
		5	188
		8	5
		11	13
		16	238
		19	16
		23	43
		25	3
	Mar.	2	210
		5	54
		8	79
		11	9
		17	97
		19	128
		22	89
		26	236
		30	137
	Apr.	2	0
		5	6
		8	0
		13	0
		16	2
		19	0
		22	0
		27	0
		30	0
	May	3	0
		6	0
		11	0
		14	0
		17	0
		20	0
		25	0
		28	0
1965	Oct.	1	0
		4	0
		7	0
		12	0
		15	0
		18	0
		21	0
		26	0
		29	0
	Nov.	1	0
		4	0
		9	0
		12	10
		15	0
		18	60
		23	8
		26	1
		29	1
	Dec.	2	16
		7	11
		10	0
		13	2
		16	21
		21	0
		23	0
		27	3
		30	3
1966	Jan.	4	36
		7	2
		10	6
		13	4
		17	1
		21	79
		24	48
		27	192

Table 1.--Continued.

Date			Number of larvae
1966	Feb.	1	153
		4	15
		7	52
		10	7
		14	10
		18	1
		21	4,012
		24	1,318
	Mar.	1	17
		4	295
		7	32
		10	155
		11	63
		15	3
		18	0
		21	8
		24	150
		29	2
	Apr.	1	1
		4	19
		7	31
		12	0
		15	13
		18	14
		21	6
		26	454
		29	15
	May	2	0
		5	0
		10	3
		13	0
		16	0
		19	0
		24	0
		27	0
		31	0

Date			Number of larvae
1966	Oct.	3	0
		6	0
		11	0
		14	0
		17	0
		20	0
		25	0
		28	0
		31	0
	Nov.	3	1
		8	0
		10	0
		14	--
		17	0
		22	0
		25	0
		28	0
	Dec.	1	0
		6	0
		9	1
		12	0
		15	3
		20	0
		23	55
		27	12
		29	0
1967	Jan.	3	1
		6	105
		9	1
		12	20
		17	3
		20	27
		23	9
		26	4
		31	0

Table 1.--Continued.

Date			Number of larvae
1967	Feb.	3	0
		6	1
		9	37
		14	3
		17	2
		20	26
		23	51
		28	9
	Mar.	1	4
		3	1
		6	16
		9	7
		14	16
		17	12
		20	144
		23	20
		28	0
		31	367
	Apr.	3	1,981
		6	83
		11	2
		14	0
		17	1
		20	4
		25	0
		28	0
	May	1	1
		4	0
		9	0
		12	0
		15	0
		18	0
		23	0
		26	0

Date			Number of larvae
1967	Oct.	2	0
		5	0
		10	0
		13	0
		16	0
		19	0
		24	0
		27	0
		30	0
	Nov.	2	0
		7	0
		9	0

SAMPLING INTERRUPTED

Date			Number of larvae
1968	Jan.	10	--
		11	--
		16	--
		23	69
		24	--
		25	--
		26	1
		29	133
	Feb.	1	72
		6	30
		9	11
		12	41
		15	138
		20	9
		23	55
		26	42
		29	90

Table 1.--Continued.

Date			Number of larvae
1968	Mar.	5	12
		8	8
		11	—
		14	5
		19	27
		22	338
		25	660
		28	1,186
	Apr.	2	16
		5	5
		8	15
		11	0
		16	0
		19	0
		22	1
		25	2
		30	0
	May	3	0
		6	2
		9	0
		14	0
		17	0
		20	0
		23	0
		28	0
		31	0
	Oct.	1	0
		4	0
		7	0
		10	0
		15	0
		18	0
		21	0
		24	0
		29	0
1968	Nov.	1	0
		4	0
		7	0
		12	0
	Dec.	5	0
SAMPLING INTERRUPTED			
1969	Jan.	14	30
		27	85
		30	332
	Feb.	4	618
		7	46
		13	86
		18	54
		20	16
		24	76
		27	3
	Mar.	4	24
		7	123
		10	201
		13	6
		21	20
		24	3
		27	118
	Apr.	1	90
		4	335
		7	38
		10	0
		15	80
		18	21
		21	10
		24	0
		29	2

Table 1.--Continued.

Date			Number of larvae
1969	May	2	1
		5	1
		8	11
		13	0
		16	0
		19	0
		22	0
		27	0
		29	0

Table 2.--Number of larval Gulf menhaden per tow collected with a Renfro beam trawl at Sabine Pass, Texas, 1963 to 1967.

Date			Number of larvae	Date			Number of larvae
1963	Mar.	6	360	1964	Feb.	5	885
		13	40			12	0
		20	9			19	44
		27	29			26	274
	Apr.	3	579		Mar.	4	37
		10	123			11	54
		17	7			18	134
		24	5			25	1,690
	May	1	0		Apr.	1	30
		8	0			8	1,806
		15	0			15	16
		22	0			22	117
		29	0			29	30
	Oct.	2	0		May	6	2
		9	0			13	1
		16	0			20	0
		23	0			27	0
		30	0				
	Nov.	6	1		Oct.	7	0
		13	5			14	0
		20	0			21	0
		27	55			28	0
	Dec.	4	--		Nov.	4	30
		11	8			12	--
		18	24			18	0
		27	65			25	187
1964	Jan.	3	9		Dec.	2	7
		8	1			9	10
		15	0			16	15
		22	2			23	6
		29	0				

Table 2.--Continued.

Date			Number of larvae	Date			Number of larvae
1965	Jan.	6	4	1965	Nov.	3	0
		13	73			10	3
		20	15			17	2
		27	24			24	9
	Feb.	3	12		Dec.	1	2
		10	10			8	34
		17	438			15	172
		24	110			22	260
						29	5
	Mar.	3	297	1966	Jan.	5	116
		10	80			12	4
		17	88			21	262
		24	2			26	451
		31	121				
	Apr.	7	106		Feb.	3	1,084
		14	99			9	122
		21	2			16	413
		28	0			23	904
	May	5	0		Mar.	2	3
		12	0			10	239
		19	0			16	10
		26	0			23	259
						30	78
	Oct.	6	0		Apr.	6	104
		13	0			13	7
		20	0			20	60
		27	0			27	121
					May	4	--
						11	0
						18	0
						25	0

Table 2.--Continued.

Date			Number of larvae	Date			Number of larvae
1966	Oct.	5	0	1967	Oct.	4	0
		12	0			11	--
		19	0			18	0
		26	0			25	0
	Nov.	2	--				
		9	0				
		16	0				
		23	0				
		30	0				
	Dec.	7	0				
		14	72				
		21	34				
		28	--				
1967	Jan.	4	16				
		11	113				
		18	109				
		25	739				
	Feb.	1	16				
		8	139				
		15	11				
		21	465				
	Mar.	1	--				
		8	28				
		15	143				
		22	204				
		29	86				
	Apr.	5	160				
		12	2				
		19	2				
		26	0				
	May	3	0				
		10	0				
		17	0				
		24	0				
		31	0				

Table 3.--Size distribution of larval Gulf menhaden collected at Galveston Entrance, Texas, for five biological years. Measurements of total length (mm) are monthly range and mean (in parenthesis) values. (Dashes denotes no collection.)

Month	Biological year				
	1959-60	1960-61	1962-63	1965-66	1966-67
Oct.	--	--	--	--	--
Nov.	--	11.5-21.5 (18.4)	12.5-21.5 (17.3)	15.0-25.0 (19.1)	19.0 (19.0)
Dec.	15.5-24.0 (20.8)	16.0-27.5 (22.4)	20.5-25.5 (23.2)	19.0-24.0 (22.4)	21.5-28.0 (24.9)
Jan.	16.5-26.5 (23.5)	19.0-27.0 (23.6)	19.0-27.5 (23.6)	21.5-27.0 (23.9)	21.0-28.0 (23.6)
Feb.	21.5-28.0 (25.6)	22.0-28.0 (25.4)	20.0-27.0 (23.4)	22.0-27.0 (24.5)	21.0-28.0 (24.1)
Mar.	21.5-28.0 (24.6)	20.5-27.5 (24.1)	22.5-29.0 (25.6)	22.0-29.0 (25.5)	22.0-29.0 (25.7)
Apr.	15.0-26.0 (20.4)	19.0-24.0 (21.7)	20.0-28.0 (24.8)	22.0-29.5 (25.4)	21.0-29.5 (26.4)
May	--	--	--	23.0-27.5 (25.0)	25.0 (25.0